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To All OIRCA Members:

Rooftop Ponding, Addressing Positive Drainage

The most popular technical questions received by the OIRCA office relate to ponding on low-slope roofing systems.

The OIRCA, the CRCA (Canadian Roofing Contractors Association) and the NRCA (National Roofing Contractors Association) in the US all define positive drainage as “the drainage condition in which consideration has been made during the design for all loading deflections of the deck and additional roof slope has been provided to ensure drainage of the roof area within 48 hours of rain during conditions conducive to drying”.

The CRCA defines ponding as “the collection of rain water in shallow pools on the surface of roofing” and the NRCA’s definition is “the excessive accumulation of water at low-lying areas on a roof that remains more than 48 hours after precipitation under conditions conducive to drying”.

Ponding should not be confused with “bird baths” which are random and inconsequential amounts of water that remain on a roof after a rainfall. Bird baths are inevitable due to construction tolerances and should not be considered as defects. With smooth surface roofing membranes such as modified bitumen and single-ply systems, this minor accumulation of water may be more pronounced. The gravel on conventional built-up roofing (BUR) systems often mask minor ponding of water.

Newly constructed buildings of course address positive drainage by sloping the structural roof deck. Roof slope is the angle a roof surface makes with the horizontal, expressed as a ratio of the units of vertical rise to the units of horizontal length. The CRCA has always recommended a minimum roof slope of 2% or 1:50 or in English units ¼” per foot.

The use of tapered roof insulation systems or lightweight insulating concrete (LWIC) are a common design remedy to introduce positive drainage on an existing structure. Structural roof decks are prone to deflection that is largely irreversible. Long term loading of the structure may cause this “creep” deflection which may have a negative effect on the roofs ability to drain water properly. The performance of a tapered roof insulation system or LWIC system is directly influenced by the condition of the roof deck and their use may or may not result in a pond free application.

Insufficient roof drainage can lead to a multitude of roof performance complications. It is a fact that well drained roofs are subject to fewer performance problems. Positive drainage provisions for thoroughly draining a roof area include the correct number, size and placement of roof drains, scuppers or gutters. Drains should be positioned at low points on a roof in locations of

maximum deck deflection, not at columns or bearing walls where deflection is at a minimum. Where designs dictate the placement of drains adjacent to a column or bearing wall the designer must allow for positive drainage.

Drains should be located in square shaped tapered sumps formed in the insulation to assist with roof system drainage. Emergency overflow drains or scuppers may also be required for parapet type roofs.

As stated, it is desirable to drain rain water as fast as it accumulates. Some roofing materials tend to deteriorate quicker when constantly wet; bituminous materials for example. Some single-ply membrane manufacturers claim ponding is acceptable on their products. Still, good roofing practice dictates that the swift departure of precipitation is appropriate.

Municipal authorities may require the use of controlled flow drains that allow water to build to a certain depth on the roof during flash storms. The weight of the stored water, anticipated time of storage and the depth of ponding all need to be factored into the roof design. Even when controlled flow drainage is to be used roof surfaces should still be sloped to drain.

Protected membrane roofing systems, often referred to as inverted roofing assemblies or upside roofs incorporate extruded polystyrene (XPS) insulation which covers the roofing membrane. A 2% slope is also recommended with these types of systems. Positive drainage is necessary to prevent the XPS from sitting in standing water potentially reducing its thermal performance.

Rooftop areas can often become cluttered with non-roofing related equipment that can interfere with positive drainage. HVAC units, skylights, equipment sleepers and photovoltaic systems for example may require tapered insulation systems, drainage crickets or saddles to redirect water around them.

Many who contemplate new roofing systems, whether associated with new construction or re-roofing, often don't consider positive drainage and become quite agitated when they discover their new roof shows signs of ponding. Rooftop ponding is difficult and expensive to address after the roof has been installed. Positive drainage must be a point of focus early on in discussions with your designer or roofing contractor.

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